UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/940,432	08/29/2001	Norihiko Murata	213278US2	7057

22850 7590 08/26/2005

OBLON, SPIVAK, MCCLELLAND, MAIER & NEUSTADT, P.C.
1940 DUKE STREET
ALEXANDRIA, VA 22314

EXAMINER	
ROSARIO, DENNIS	

ART UNIT	PAPER NUMBER
2621	

DATE MAILED: 08/26/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/940,432	MURATA ET AL.	
	Examiner	Art Unit	
	Dennis Rosario	2621	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *09 May 2005*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-24* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-24* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *29 August 2001* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *6/13/05 8/2/05*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

1. The amendment was received on May 9, 2005. Claims 1-24 are pending.

Terminal Disclaimer

2. The terminal disclaimer filed on 5/9/2005 disclaiming the terminal portion of any patent granted on this application which would extend beyond the expiration date of any patent granted on Application Number 09/645,511 has been reviewed and is accepted. The terminal disclaimer has been recorded.

Response to Arguments

3. Applicant's arguments regarding claim 1, page 3, line 10 of the amendment filed 5/9/2005 have been fully considered but they are not persuasive which states:

> However, Herman fails to teach Applicant's claimed "object plain."

However, Herman does teach Applicant's claimed "object plain" or "input image" in col. 19, lines 35-37 and shown in fig. 9 as the top square or input image that outputs "T3" and represents an object plane because the input image, which inherently is a plane, includes an "object" in col. 19, line 43; hence, the input image of fig. 9 is an object plane. Thus, the claimed "object plane" is broad enough to use the Herman reference.

4. Applicant's arguments regarding claim 1, on page 3, last paragraph to page 4, line 2, filed 5/9/2005 have been fully considered but they are not persuasive which states:

Further, Herman does not teach or suggest "determining a feature point of one of the plurality of partially overlapping images corresponding to a common location of the original image, shared by the plurality of partially overlapping images, and determining a matched point of one of the other partially overlapping images corresponding to the feature point **so that a direction of the object plane is calculated** based on the feature point and the matched point" (emphasis added), as recited in independent Claim 1.

However, Herman does teach or suggest determining a feature point (A "user" in col. 17, line 17 determines the claimed feature point or "common features" in col.17, line 19 which are represented by "corresponding points" in col. 6, line 49. In an alternative, as opposed to a user selecting corresponding points an automatic or "adaptive selection" in col. 21, line 51 is used to "extract edge structure" in col. 21, line 42 which corresponds to the claimed feature point to ultimately output vectors or the below claimed direction.)...

...of one of the plurality of partially overlapping images corresponding to a common location of the original image, shared by the plurality of partially overlapping images, and determining a matched point of one of the other partially overlapping images corresponding to the feature point (A "user" in col. 17, line 17 determines the claimed feature point or "common features" in col.17, line 19, which are represented by "corresponding points" in col. 6, line 49, of one of the plurality of partially overlapping images, as shown in fig. 9, top square that outputs "T3", corresponding to a common location of the original image, shared by the plurality of partially overlapping images, and determining a matched point, which is one of the above mentioned corresponding points, of one of the other or "different [partially overlapping or "degree of overlap" in col. 5, line 7] images" in col. 6, line 50 as shown in fig. 9 as a square outputting "T2", corresponding to the feature point of the image that outputs "T3", which is one of the other above mentioned corresponding points.)...

...so that a direction (A "user" in col. 17, line 17 determines the claimed feature point or "common features" in col.17, line 19, which are represented by "corresponding points" in col. 6, line 49, of one of the plurality of partially overlapping images, as shown in fig. 9, top square that outputs "T3", corresponding to a common location of the original image, shared by the plurality of partially overlapping images, and determining a matched point, which is one of the above mentioned corresponding points, of one of the other or "different [partially overlapping or "degree of overlap" in col. 5, line 7] images" in col. 6, line 50 as shown in fig. 9 as a square outputting "T2" corresponding to the feature point of the image of fig. 9, top square outputting "T3", which is one of the other above mentioned corresponding points so that a direction or "vector[ ]" in col. 22, line 35...)...

...of the object plane (A "user" in col. 17, line 17 determines the claimed feature point or "common features" in col.17, line 19, which are represented by "corresponding points" in col. 6, line 49, of one of the plurality of partially overlapping images, as shown in fig. 9, top square that outputs "T3", corresponding to a common location of the original image, shared by the plurality of partially overlapping images, and determining a matched point, which is one of the above mentioned corresponding points, of one of the other or "different [partially overlapping or "degree of overlap" in col. 5, line 7] images" in col. 6, line 50 as shown in fig. 9 as a square outputting "T2" corresponding to the feature point of the image of fig. 9, top square outputting "T3", which is one of the other above mentioned corresponding points so that a direction or "vector[ ]" in col. 22, line 35 of the object plane or "input image" in col. 19, lines 35-37 and shown in fig. 9 as the top square or input image that outputs "T3" and represents an object plane because the input image, which inherently is a plane, includes an "object" in col. 19, line 43; hence, the input image of fig. 9 is an object plane ...)...

...is calculated based on the feature point and the matched point (A "user" in col. 17, line 17 determines the claimed feature point or "common features" in col.17, line 19, which are represented by "corresponding points" in col. 6, line 49, of one of the plurality of partially overlapping images, as shown in fig. 9, top square that outputs "T3", corresponding to a common location of the original image, shared by the plurality of partially overlapping images, and determining a matched point, which is one of the above mentioned corresponding points, of one of the other or "different [partially overlapping or "degree of overlap" in col. 5, line 7] images" in col. 6, line 50 as shown in fig. 9 as a square outputting "T2" corresponding to the feature point of the image of fig. 9, top square outputting "T3", which is one of the other above mentioned corresponding points so that a direction or "vector[ ]" in col. 22, line 35 of the object plane or "input image" in col. 19, lines 35-37 and shown in fig. 9 as the top square or input image that outputs "T3" and represents an object plane because the input image, which inherently is a plane, includes an "object" in col. 19, line 43; hence, the input image of fig. 9 is an object plane, [the direction or vector also referred to as "alignment parameters" in col. 22, lines 33-35] is calculated using an "absolute difference" in col. 21, line 21 based on an "Interactive View of Alignment" in col. 16, line 57 which uses the feature point or "common features" in col.17, line 19 which are represented by "corresponding points" in col. 6, line 49,hence, corresponding feature points, and the matched point which is one of the above mentioned corresponding points.

Note that the Interactive View of Alignment "technique" in col. 18, line 48 is used with the embodiment of fig. 7, num. 716 or "front-end" in col. 22, line 34 that outputs the above mentioned "vectors" in col. 22, line 35 as mentioned in col. 18, lines 47-49.).

5. Applicant's arguments on page 4, lines 11,12 filed 5/9/2005 have been fully considered but they are not persuasive and states:

Herman does not teach the perspective projection matrix operation of dependent claims 17-22.

However, Herman does teach the perspective projection matrix operation or "Alignment methods" in col. 8, line 7 or "Existing methods for aligning" in col. 8, line13 which "provides...geometric transformations" col. 8, line 14 using "least square error" in col. 8, line 18 or "least square adjustment" in col. 15, line 39. Thus, alignment methods use geometric transformations that use a least square error. Where the least square error uses a matrix or "matrices" in col. 15, line 47. Thus, the alignment method is a matrix operation because it uses matrices via the geometric transforms. Also the alignment method uses "factors" in col. 8, line 8 that includes a "projective transformation" in col. 8, line 3. Thus, the alignment method is a projection matrix operation, because, it uses matrices via the geometric transforms and uses projective transformation factors.

Also, the alignment method uses a "three dimensional distribution of objects" in col. 8, lines 6,7 which corresponds to a 3D perspective. Thus, the alignment method is a perspective projection matrix operation, because, it uses matrices via the geometric transforms and uses projective transformation factors and uses a three dimensional distribution of objects. In addition, Herman et al. teaches "perspective" in col. 25, line 10 in the context of "alignments" in col. 25, line 8.

6. Applicant's arguments, see amendment, pages 5,6, filed 5/9/2005, with respect to the rejection(s)of claim(s) 2 and 11 under Herman et al. (US Patent 6,075,905 A) in view of Inuiya (US Patent 6,597,468 B1) have been fully considered and are persuasive. Therefore, the rejection has been withdrawn. However, upon further consideration, a new ground(s) of rejection is made in view of Herman et al. (US Patent 6,075,905 A) in view of Miyakawa et al. (US Patent 4,783,829 A).

Specification

7. The disclosure is objected to because of the following informalities:

Page 23, line 12: "(ORD)" ought to be amended to "(ORS)".

Page 24, lines 14 and 20 "IDS" ought to be amended to "IDC".

Page 28, line 4: "$I_s(x,y)$" ought to be amended to "$\bar{I}_s(x,y)$" with a bar on top as shown in the equation on page 27.

Page 28, line 7: "$I_r(x,y)$" ought to be amended to "$\bar{I}_r(x,y)$" with a bar on top as shown in the equation on page 27.

Page 29, line 7: "thee" ought to be amended to "the".

Page 62, line 7: "ORB" ought to be amended to "ORD".

Page 76, last paragraph about priority ought to be moved to the beginning of page 2.

Appropriate correction is required.

Claim Rejections - 35 USC § 112

8. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

9. Claims 1,6,7,9,15 and 16 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Regarding claim 1, line 6 has the phrase "the original image", further elaborated in claim 1, line 2: "original image of an object plane", which is not too clear with respect to claim 1, line 13: "direction of the object plane" as to what the claimed "original image" specifically is. Is the "original image" actually a tangible object plane or analog plane/image/paper poster/sheet of paper, as shown in the specification in fig. 1, label PL, ready for capturing by a camera or the claimed "oblique imaging" in claim 1, line 2 where the claimed "direction of the object plane" is of the tangible object or analog image/paper poster/sheet of paper? Or is the claimed "original image" a captured digital image after the claimed "oblique imaging," as represented in fig. 1, label IM1, where the claimed "direction of the object plane" is the plane of the digital image? Or is the "original image" both an analog image plane, as shown in fig. 1, label PL and captured via the claimed "oblique imaging" digital image plane, as represented in fig. 1, label IM1 where the claimed "direction of the object plane" is of the digital image plane? Or is the claimed "original image of an object plane" both an analog image plane, as shown in fig. 1, label PL and captured or the claimed "taken" in claim 1, line 2 digital image plane, as

represented in fig. 1, label IM1 where the claimed "direction of the object plane" is of the analog image plane?

Alternatively, what is the claimed "object plane" of claim 1, line 13? Is the "object plane" the claimed "original image" taken/captured by a camera or is it a tangible object or analog image/paper poster/sheet of paper that is oriented relative to a camera to generate the clamed "original image" or claimed "original image of an object plane"?

Currently, claim 1 is interpreted to mean that the claimed "original image" in line 6 is equivalent to the claimed "the object plane" in line 8.

Thus, claim 1, line 2, "original image" ought to be amended to "original tangible image";

and lines 5-9 ought to be amended to:

determining a feature point of one of the plurality of partially overlapping images corresponding to a common location of the original **tangible** image, shared by the plurality of partially overlapping images, and determining a matched point of one of the other partially overlapping image corresponding to the feature point so that a direction of the **tangible** object plane is calculated based on the feature point and the matched point.

Or claim 1, line 2, "original image" ought to be deleted; and

line 2, "object" ought to be amended to "tangible object".

line 6, "original image" ought to be amended to "tangible object".

Currently, the Herman et al. reference does not calculate a direction of a tangible object plane, instead Herman calculates vectors between digital images that includes objects, hence object plane, where the digital images are not tangible/touchable.

Note, see reference cited below that appears to teach a distinction between an object and object plane and captured digital images of the object and object plane.

Claim Rejections - 35 USC § 102

10. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

11. Claims 1-24 are rejected under 35 U.S.C. 102(b) as being anticipated by Herman et al. (US Patent 6,075,905 A).

Regarding claim 1, Herman et al. discloses an image processing method, apparatus and means for correcting image distortions caused by oblique imaging in which an original image of an object on an object plane is taken from different oblique directions to obtain a plurality of partially overlapping images, comprising the steps of:

a) a correspondence detecting unit (Fig. 1,num. 103:IMAGE ALIGNMENT) and first program code means (Fig. 8,num. 820: CORRELATE TO REFERENCE is part of a flow chart that corresponds to fig. 1,num. 103:IMAGE ALIGNMENT) for determining a feature point (Fig. 1,num. 103:IMAGE ALIGNMENT determines "corresponding points" in col. 4, lines 59,60. Thus, one point from the corresponding points can be a feature point.) of one of the plurality of partially overlapping images (Fig. 1,num. 102: SOURCE IMAGE SELECTION "finds a set of... images" in col. 4, line 26 that are overlapped in col. 5, lines 5-7 where the corresponding points of each image are determined.) corresponding to a common location of the original image, shared (Each set of images "cover [or shares] the intended domain and content" in col. 4, lines 26,27. The intended domain refers to the claimed common location in the set of images.) by the plurality of partially overlapping images (The set of images from fig. 1, num. 102 are overlapped in col. 5, lines 5-7.), and

b) determining a matched point (Fig. 1,num. 103:IMAGE ALIGNMENT determines "corresponding points" in col. 4, lines 59,60. Thus, one point from the corresponding points can be a matched point.) of one of the other partially overlapping images corresponding (Fig. 1,num. 102: SOURCE IMAGE SELECTION "finds a set of...images" in col. 4, line 26 where the corresponding points "...in overlapped regions...(col. 1, lines 29,30)" of each image are to be determined. Thus, one image from the set of images is the other image.) to the feature point (Fig. 1,num. 103:IMAGE ALIGNMENT determines "corresponding points" in col. 4, lines 59,60. Thus, one point from the corresponding points can be a feature point.) so that a direction (The method of determining "corresponding points in overlapped regions" in col. 1, lines 29-30 and col. 4, lines 58-60 is equivalent via an "or" statement in col. 1, line 28 to a method of "measurements of the camera viewing direction" in col. 1, lines 26-30, because both methods are used to align images.) of the object plane (Each image or "pairs of overlapping frames" has an associated surface in col. 10, lines 32-34 where the surface represents features of an object.

Alternatively, the object plane or "input image" in col. 19, lines 35-37 and shown in fig. 9 as the top square or input image that outputs "T3" and represents an object plane because the input image, which inherently is a plane, includes an "object" in col. 19, line 43; hence, the input image of fig. 9 is an object plane.) is calculated (The surface or object plane is calculated or "computed" in col. 10, line 36.) based on the feature point and the matched point ("Matched measures" in col. 10, lines 34-36 or the corresponding points as matched measures are used to compute the surface or object plane or

additionally, Herman et al. discloses step b) alternatively:

A "user" in col. 17, line 17 determines the claimed feature point or "common features" in col.17, line 19 which are represented by "corresponding points" in col. 6, line 49. In an alternative, as opposed to a user selecting corresponding points an automatic or "adaptive selection" in col. 21, line 51 is used to "extract edge structure" in col. 21, line 42 which corresponds to the claimed feature point to ultimately output vectors as described below or the below claimed direction.)...

...of one of the plurality of partially overlapping images corresponding to a common location of the original image, shared by the plurality of partially overlapping images, and determining a matched point of one of the other partially overlapping images corresponding to the feature point (A "user" in col. 17, line 17 determines the claimed feature point or "common features" in col.17, line 19, which are represented by "corresponding points" in col. 6, line 49, of one of the plurality of partially overlapping images, as shown in fig. 9, top square that outputs "T3", corresponding to a common location of the original image, shared by the plurality of partially overlapping images, and determining a matched point, which is one of the above mentioned corresponding points, of one of the other or "different [partially overlapping or "degree of overlap" in col. 5, line 7] images" in col. 6, line 50 as shown in fig. 9 as a square outputting "T2", corresponding to the feature point of the image that outputs "T3", which is one of the other above mentioned corresponding points.) so that a direction...

...(A "user" in col. 17, line 17 determines the claimed feature point or "common features" in col.17, line 19, which are represented by "corresponding points" in col. 6, line 49, of one of the plurality of partially overlapping images, as shown in fig. 9, top square that outputs "T3", corresponding to a common location of the original image, shared by the plurality of partially overlapping images, and determining a matched point, which is one of the above mentioned corresponding points, of one of the other or "different [partially overlapping or "degree of overlap" in col. 5, line 7] images" in col. 6, line 50 as shown in fig. 9 as a square outputting "T2" corresponding to the feature point of the image of fig. 9, top square outputting "T3", which is one of the other above mentioned corresponding points so that a direction or "vector[ ]" in col. 22, line 35...) ...

...of the object plane (A "user" in col. 17, line 17 determines the claimed feature point or "common features" in col.17, line 19, which are represented by "corresponding points" in col. 6, line 49, of one of the plurality of partially overlapping images, as shown in fig. 9, top square that outputs "T3", corresponding to a common location of the original image, shared by the plurality of partially overlapping images, and determining a matched point, which is one of the above mentioned corresponding points, of one of the other or "different [partially overlapping or "degree of overlap" in col. 5, line 7] images" in col. 6, line 50 as shown in fig. 9 as a square outputting "T2" corresponding to the feature point of the image of fig. 9, top square outputting "T3", which is one of the other above mentioned corresponding points so that a direction or "vector[ ]" in col. 22, line 35 of the object plane or "input image" in col. 19, lines 35-37 and shown in fig. 9 as the top square or input image that outputs "T3" and represents an object plane because the input image, which inherently is a plane, includes an "object" in col. 19, line 43; hence, the input image of fig. 9 is an object plane ...)...

...is calculated based on the feature point and the matched point (A "user" in col. 17, line 17 determines the claimed feature point or "common features" in col.17, line 19, which are represented by "corresponding points" in col. 6, line 49, of one of the plurality of partially overlapping images, as shown in fig. 9, top square that outputs "T3", corresponding to a common location of the original image, shared by the plurality of partially overlapping images, and determining a matched point, which is one of the above mentioned corresponding points, of one of the other or "different [partially overlapping or "degree of overlap" in col. 5, line 7] images" in col. 6, line 50 as shown in fig. 9 as a square outputting "T2" corresponding to the feature point of the image of fig. 9, top square outputting "T3", which is one of the other above mentioned corresponding points so that a direction or "vector[ ]" in col. 22, line 35 of the object plane or "input image" in col. 19, lines 35-37 and shown in fig. 9 as the top square or input image that outputs "T3" and represents an object plane because the input image, which inherently is a plane, includes an "object" in col. 19, line 43; hence, the input image of fig. 9 is an object plane, [the direction or vector also referred to as "alignment parameters" in col. 22, lines 33-35] is calculated using an "absolute difference" in col. 21, line 21 based on an "Interactive View of Alignment" in col. 16, line 57 which uses the feature point or "common features" in col.17, line 19 which are represented by "corresponding points" in col. 6, line 49,hence, corresponding feature points, and the matched point which is one of the above mentioned corresponding points.

Note that the Interactive View of Alignment "technique" in col. 18, line 48 is used with the embodiment of fig. 7, num.716... or "front-end" in col. 22, line 34 that outputs the above mentioned "vectors" in col. 22, line 35 as mentioned in col. 18, lines 47-49.);

c) a standard image setting unit (fig. 2 is a setting or selecting unit that corresponds with fig. 7,num. 720: BACK END ALIGNMENT.) and second program means (Fig. 15 is a flow chart that contains a means 1512 in col. 22, line 49 that allows a selection of an image in col. 22, lines 48-54.) for selecting one (fig. 1,num. 107: OUTPUT FORMATTING AND PREPARATION corresponds to fig. 7,num. 720: BACK-END ALIGNMENT where a selection step of an image is performed in col. 22, lines 51-57.) of the plurality of partially overlapping images (The set of images from fig. 1, num. 102 are overlapped in col. 5, lines 5-7.) as a standard image (The selected image is "based on... criteria" in col. 22, lines 51,52. Thus an image selected based upon criteria is a standard image that adheres to the criteria.) whose image distortions are to be corrected (The standard image or selected image which is based on the criteria to "minimizes distortion" in col. 22, lines 58-60.); and

d) a distortion correcting unit (Fig. 7, num. 720: BACK END ALIGNMENT) and third program means (Fig. 15 is a flow chart for the BACK END ALIGNMENT where step 1522:WARP IMAGE TO MOSAIC USING is used for generating a distortion corrected image.) for generating a distortion-corrected image (Fig. 7, num. 720: BACK END ALIGNMENT using the method of fig. 15, step 1522 generates a corrected image with "...minim[um] distortion of the image..." in col. 22, lines 58,59.) on a projection plane ("frames" in col. 10, line 27 contain "surfaces" in col. 10, line 28 that are used for alignment as described in col. 10, lines 19-42. Thus, the frames with surfaces are used with the BACK END ALIGNMENT of fig. 7, num. 720 or *alternatively,* Fig. 7, num. 720: BACK END ALIGNMENT is the distortion correcting unit that uses the third program means of fig. 15, step 1522 that generates a corrected image with "...minim[um] distortion of the image..." in col. 22, lines 58,59 on a projection plane or "mosaic" in col. 1, line 36 and col. 22, line 36 where the mosaic is a projection plane or "projecting...imaging plane" in col. 1, lines 36,37 for frames or images.) by projecting (A "projective" parameter in col. 4, lines 49-51 is used to align images in col. 4, lines 46-51 or *alternatively,* Fig. 7, num. 720: BACK END ALIGNMENT is the distortion correcting unit that uses the third program means of fig. 15, step 1522 that generates a corrected image with "...minim[um] distortion of the image..." in col. 22, lines 58,59 on a projection plane or "mosaic" in col. 1, line 36 and col. 22, line 36 where the mosaic is a projection plane or "projecting...imaging plane" in col. 1, lines 36,37 for frames or images by projecting "with a projective transform" in col. 23, line 10.)...

...the standard image (or *alternatively,* Fig. 7, num. 720: BACK END ALIGNMENT is the distortion correcting unit that uses the third program means of fig. 15, step 1522 that generates a corrected image with "...minim[um] distortion of the image..." in col. 22, lines 58,59 on a projection plane or "mosaic" in col. 1, line 36 and col. 22, line 36 where the mosaic is a projection plane or "projecting...imaging plane" in col. 1, lines 36,37 for frames or images by projecting the frames or "images...with a projective transform" in col. 23, line 10, which corresponds to the selected image that is "based on... criteria" in col. 22, lines 51,52. Thus an image selected based upon criteria is a standard image that adheres to the criteria is projected for aligning.) onto the projection plane ("surfaces" in col. 10, line 28 or *alternatively,* Fig. 7, num. 720: BACK END ALIGNMENT is the distortion correcting unit that uses the third program means of fig. 15, step 1522 that generates a corrected image with "...minim[um] distortion of the image..." in col. 22, lines 58,59 on a projection plane or "mosaic" in col. 1, line 36 and col. 22, line 36 where the mosaic is a projection plane or "projecting...imaging plane" in col. 1, lines 36,37 for frames or images by projecting the frames or "images...with a projective transform" in col. 23, line 10, which corresponds to the selected image that is "based on... criteria" in col. 22, lines 51,52. Thus an image selected based upon criteria is a standard image that adheres to the criteria is projected for aligning onto the projection plane or mosaic that is constructed of surfaces.)...

...based on the direction (The method of determining "corresponding points in overlapped regions" in col. 1, lines 29-30 and col. 4, lines 58-60 is equivalent via an "or" statement in col. 1, line 28 to a method of "measurements of the camera viewing direction" in col. 1, lines 26-30, because both methods are used to align images or *alternatively,* Fig. 7, num. 720: BACK END ALIGNMENT is the distortion correcting unit that uses the third program means of fig. 15, step 1522 that generates a corrected image with "...minim[um] distortion of the image..." in col. 22, lines 58,59 on a projection plane or "mosaic" in col. 1, line 36 and col. 22, line 36 where the mosaic is a projection plane or "projecting...imaging plane" in col. 1, lines 36,37 for frames or images by projecting the frames or "images...with a projective transform" in col. 23, line 10, which corresponds to the selected image that is "based on... criteria" in col. 22, lines 51,52. Thus an image selected based upon criteria is a standard image that adheres to the criteria is projected for aligning onto the projection plane or mosaic that is constructed of surfaces based on the direction or "vectors" in col. 22, line 35 because the vectors are used for "creat[ing] the...mosaic" in col. 22, line 36.) of the object plane (Each image or "pairs of overlapping frames" has an associated surface in col. 10, lines 32-34.) such that image distortions (A "distortion" in col. 22, line 59.) in the standard image (The selected image is "based on... criteria" in col. 22, lines 51,52.) are eliminated (The standard image or selected image based on the criteria minimizes a distortion in col. 22, lines 58-60. Thus, image distortions are eliminated or minimized.).

Regarding claim 2, Herman et al. teaches the method according to claim 1 wherein in said selecting step (fig. 1,num. 107: OUTPUT FORMATTING AND PREPARATION corresponds to fig. 7,num. 720: BACK-END ALIGNMENT where a selection step is performed in col. 22, lines 51-57.), one of the plurality of partially overlapping images (The set of images from fig. 1, num. 102 are overlapped in col. 5, lines 5-7.) is automatically selected ("selected...automatically" in col. 4, lines 23-25) as the standard (The selected image is "based on... criteria" in col. 22, lines 51,52. Thus, an image selected based upon criteria is a standard image that adheres to the criteria.) based on a ratio (The selected image is "based on... criteria" in col. 22, lines 51,52. Thus, an image selected based upon criteria is a standard image that adheres to the criteria based on a ratio or percentage of at least "50%", in col. 18, line 42.) of an area of an object region (The selected image is "based on... criteria" in col. 22, lines 51,52. Thus an image selected based upon criteria is a standard image that adheres to the criteria based on a ratio or a percentage of at least "50%", in col. 18, line 42, of an area of an object region or "overlap" in col. 18, line 41 of a "reference image (RI)" in col. 18, line 39 where the reference image corresponds to the "input image" in col. 19, lines 35-37 and shown in fig. 9 as the top square or input image that outputs "T3" and represents an object region because the input image, which inherently is a region, includes an "object" in col. 19, line 43; hence, the input image of fig. 9 is an object region.)...

...to an entire area of each image (The selected image is "based on... criteria" in col. 22, lines 51,52. Thus, an image selected based upon criteria is a standard image that adheres to the criteria based on a ratio or percentage, of at least "50%", in col. 18, line 42, of an area of an object region or an area of "overlap" in col. 18, line 41 of a "reference image (RI)" in col. 18, line 39 to "images" in col. 18, line 40, where the reference image corresponds to the "input image" in col. 19, lines 35-37 and shown in fig. 9 as the top square or input image that outputs "T3" and represents an object region, because the input image, which inherently is a region, includes an "object" in col. 19, line 43; hence, the input image of fig. 9 is an object region, to an entire area of each image or at least 50% overlap or 100% overlap of each "image[ ]" in col. 18, line 40 with the reference image as mentioned in col. 18, lines 39-43 ". Note that image selection based on overlap in the section of col. 7, lines 55-67 which is described in terms of a percentage, "50%" in col. 18, line 42 or "some... value" in col. 18, line 42 where the percentage is a ratio, (50/100)*100, to one of ordinary skill in the art and where some value suggests a number, 0.5, which can be expressed as a ratio, 50/100, to generate a percentage, .5*100=50% to one of ordinary skill in the art.).

Regarding claim 3, Herman et al. discloses the image processing method according to claim 1 wherein in said selecting step, (fig. 1,num. 107: OUTPUT FORMATTING AND PREPARATION corresponds to fig. 7,num. 720: BACK-END ALIGNMENT where a selection step is performed in col. 22, lines 51-57.), one of the plurality of partially overlapping images (The set of images from fig. 1, num. 102 are overlapped in col. 5, lines 5-7.) is automatically selected ("selected...automatically" in col. 4, lines 23-25) as the standard (The selected image is "based on... criteria" in col. 22, lines 51,52. Thus an image selected based upon criteria is a standard image that adheres to the criteria.) based on a direction of a straight-line pattern ("pattern orientation" in col. 7, line 35 is used in the section "Quality Based Selection" in col. 7, lines 12-55 to select an image.) contained in each image.

Regarding claim 4, Herman et al. discloses the image processing method according to claim 1 wherein in said selecting step, (fig. 1,num. 107: OUTPUT FORMATTING AND PREPARATION corresponds to fig. 7,num. 720: BACK-END ALIGNMENT where a selection step is performed in col. 22, lines 51-57.), one of the plurality of partially overlapping images (The set of images from fig. 1, num. 102 are overlapped in col. 5, lines 5-7.) is automatically selected ("selected...automatically" in col. 4, lines 23-25) as the standard (The selected image is "based on... criteria" in col. 22, lines 51,52. Thus an image selected based upon criteria is a standard image that adheres to the criteria.) based (The selection step of fig. 1,num. 107 is based on the feature point and the matched point determined in step 103 of fig. 1.) on the feature point (Fig. 1,num. 103:IMAGE ALIGNMENT determines "corresponding points" in col. 4, lines 59,60. Thus, one point from the corresponding points can be a feature point.) and the matched point (Fig. 1,num. 103:IMAGE ALIGNMENT determines "corresponding points" in col. 4, lines 59,60. Thus, one point from the corresponding points can be a matched point while the other can be the feature point.) determined by said determining step (Fig. 1,num. 103:IMAGE ALIGNMENT determines "corresponding points" in col. 4, lines 59,60.).

Regarding claim 5, Herman et al. discloses the image processing method according to claim 1, wherein in said selecting step (fig. 1,num. 107: OUTPUT FORMATTING AND PREPARATION corresponds to fig. 7,num. 720: BACK-END ALIGNMENT where a selection step is performed in col. 22, lines 51-57.), one of the plurality of partially overlapping images (The set of images from fig. 1, num. 102 are overlapped in col. 5, lines 5-7.) is automatically selected ("selected...automatically" in col. 4, lines 23-25) as the standard (The selected image is "based on... criteria" in col. 22, lines 51,52. Thus an image selected based upon criteria is a standard image that adheres to the criteria.), based on a calculated direction (The method of determining "corresponding points in overlapped regions" in col. 1, lines 29-30 and col. 4, lines 58-60 is equivalent via an "or" statement in col. 1, line 28 to a method of "measurements of the camera viewing direction" in col. 1, lines 26-30, because both methods are used to align images.) of the object plane (Each image or "pairs of overlapping frames" has an associated surface in col. 10, lines 32-34.) for each of the partially overlapping images (Fig. 1,num. 102: SOURCE IMAGE SELECTION "finds a set of...images" in col. 4, line 26 where the corresponding points "...in overlapped regions...(col. 1, lines 29,30)" of each image are to be determined.).

Claim 6 is similar to claim 1, except for the limitation of

a) an image composition unit (Fig. 7, num. 722: BLENDING) and program code means (Fig. 7,num. 722 in col. 18, line 2 is used with "software" for a computer in col. 17, lines 58-64.) for combining (Fig. 7, num. 722: BLENDING blends the images of the corresponding step of fig. 1,num. 107: OUTPUT FORMATTING AND PREPARATION.) the other partially overlapping images (Fig. 1,num. 102: SOURCE IMAGE SELECTION "finds a set of...images" in col. 4, line 26 where the corresponding points "...in overlapped regions...(col. 1, lines 29,30)" of each image are to be determined. Thus, one image from the set of images is the other image.), which are projected (A "projective" parameter in col. 4, lines 49-51 is used to align images in col. 4, lines 46-51.) onto an image surface ("frames" in col. 10, line 27 contain "surfaces" in col. 10, line 28 that are used for alignment as described in col. 10, lines 19-42. Thus, the frames with surfaces are used with the BACK END ALIGNMENT of fig. 7, num. 720.) of the standard image (The selected image is "based on... criteria" in col. 22, lines 51,52. Thus, an image that is selected based upon criteria is a standard image that adheres to the criteria and is used for "alignment" in col. 22, lines 58-60 of the other images.) with respect (The selected image is the "initial mosaic" in col. 22, line 58 where the other images will be projected in the "final alignment" in col. 22, line 60 with respect to the initial mosaic. Note that any alignment "entails" in col. 4, line 46 a parameter that is projective via a transform in col. 4, lines 46-51.)...

to each of the other partially overlapping images (Fig. 1,num. 102: SOURCE IMAGE SELECTION "finds a set of...images" in col. 4, line 26 where the corresponding points "...in overlapped regions...(col. 1, lines 29,30)" of each image are to be determined. Thus, one image from the set of images is the other image.), so that a composite image (Fig. 7, num. 724: SEAMLESS MOSAIC) is generated on the image surface ("surfaces" in col. 10, line 28 as used to create the composite image.) so as to correct (The standard image or "initial mosaic" in col. 22, line 58 is "select[ed]" in col. 22, line 55 to "minimize distortion[s]" in col. 22, lines 58,59.) image distortions (A "distortion" in col. 22, line 59.) in the standard image (The selected image or initial mosaic is "based on... criteria" in col. 22, lines 51,52. Thus an image selected based upon criteria is a standard image that adheres to the criteria.).

Claim 7 is rejected the same as claims 1 and 6. Thus, argument similar to that presented above for claims 1 and 6 are equally applicable to claim 7.

Regarding claim 8, Herman et al. discloses the image processing apparatus according to claim 7,

a) wherein said standard image setting unit (fig. 7,num. 720: BACK-END ALIGNMENT) is configured such that a user ("user selection" in col. 22, lines 53,54) is required to select the standard image (The selected image is the "initial mosaic" in col. 22, line 58) when taking the original image from one of the oblique directions (A camera obtains the original image at a viewing direction in col. 1, lines 26-28.), and

b) wherein said image processing apparatus (fig. 1 is an image processing apparatus.) further comprises a notification unit (Fig. 1,num. 107: OUTPUT FORMATTING AND PREPARATION contains a program shown in fig. 15 that contains a notification unit at fig. 15, step 1512: ESTABLISH COORDINATE SYSTEM.) which notifies the user (A user at step 1512 can select the standard image in col. 22, lines 51-54.) that the standard image is currently taken.

Claim 9 is rejected the same as claims 1 and 7. Thus, argument similar to that presented above for claims 1 and 7 are equally applicable to claim 9.

Claim 10 is rejected the same as claim 8. Thus, argument similar to that presented above for claim 8 is equally applicable to claim 10.

Claim 11 is rejected the same as claim 2. Thus, argument similar to that presented above for claim 2 is equally applicable to claim 11.

Claims 12,13 and 14 are rejected the same as claims 3,4 and 5, respectively. Thus, arguments similar to that presented above for claims 3,4 and 5 are equally applicable to claims 12,13 and 14, respectively.

Claim 15 is rejected the same as claim 1. Thus, argument similar to that presented above for claim 1 is equally applicable to claim 15.

Claim 16 is rejected the same as claim 6. Thus, argument similar to that presented above for claim 6 is equally applicable to claim 16.

Regarding claim 17, Herman et al. discloses the image processing method of claim 1, wherein said standard image (The selected image is "based on... criteria" in col. 22, lines 51,52. Thus, an image that is selected based upon criteria is a standard image that adheres to the criteria and is used for "alignment" in col. 22, lines 58-60 of the other images.) is projected (A "projective" parameter in col. 4, lines 49-51 is used to align images in col. 4, lines 46-51.) with a perspective projection matrix operation ("matrices" in col. 15, line 47 are used for "image-registration" in col. 15, line 34 and "registration" in col. 4, lines 44,45 or alignment that "entails" in col. 4, line 46 as projective parameter in col. 4, lines 49-51 or *alternatively, Herman et al. discloses a perspective matrix operation* or "Alignment methods" in col. 8, line 7 or "Existing methods for aligning" in col. 8, line13 which "provides...geometric transformations" col. 8, line 14 using "least square error" in col. 8, line 18 or "least square adjustment" in col. 15, line 39. Thus, alignment methods use geometric transformations that use a least square error. Where the least square error uses a matrix or "matrices" in col. 15, line 47. Thus, the alignment method is a matrix operation because it uses matrices via the geometric transforms. Also the alignment method uses "factors" in col. 8, line 8 that includes a "projective transformation" in col. 8, line 3. Thus, the alignment method is a projection matrix operation, because, it uses matrices via the geometric transforms and uses projective transformation factors.

Also, the alignment method uses a "three dimensional distribution of objects" in col. 8, lines 6,7 which corresponds to a 3D perspective. Thus, the alignment method is a perspective projection matrix operation, because, it uses matrices via the geometric transforms and uses projective transformation factors and uses a three dimensional distribution of objects. In addition, Herman et al. teaches "perspective" in col. 25, line 10 in the context of "alignments" in col. 25, line 8.).

Claims 18,19,20,21 and 22 are rejected the same as claim 17. Thus, argument similar to that presented above for claim 17 is equally applicable to claims 18,19,20,21 and 22.

Regarding claim 23, Herman et al. discloses the image processing method of claim 17, wherein said perspective projection matrix ("matrices" in col. 15, line 47 are used for "image-registration" in col. 15, line 34 and "registration" in col. 4, lines 44,45 or alignment that "entails" in col. 4, line 46 as projective parameter in col. 4, lines 49-51.) is calculated based on coordinates of at least four combinations of feature points ("corresponding points" in col. 4, line 59,60 are used for images. Thus, two images can have 2 or more corresponding points selected by a user who can select any combination of 2 or more corresponding points.) of the standard image (The selected image is "based on... criteria" in col. 22, lines 51,52. Thus, an image that is selected based upon criteria is a standard image that adheres to the criteria and is used for "alignment" in col. 22, lines 58-60 of the other images.) and matched points corresponding thereto.

Regarding claim 24, Herman et al. discloses the image processing method of claim 18, wherein a least-square-method ("least-square adjustment" in col. 15, line 39) is used to find parameters (The least square adjustment is used solve for "parameters" in col. 15, line 49 via a transform in col. 15, line 40.) of said perspective projection matrix ("matrices" in col. 15, line 47 contain parameters in col. 15, lines 50,51 and are used for "image-registration" in col. 15, line 34 and "registration" in col. 4, lines 44,45 or alignment that "entails" in col. 4, line 46 as projective parameter in col. 4, lines 49-51.).

Conclusion

12. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Kitaguchi et al. (US Patent 6,038,074 A) is pertinent as teaching a method of projection in fig. 15, num. 106 and combining images as shown in fig. 18 based on an OBJECT and OBJECT PLANE TO BE INPUT.

13. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Dennis Rosario whose telephone number is (571) 272-7397. The examiner can normally be reached on 6-3.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Joseph Mancuso can be reached on (571) 272-7695. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

DR
Dennis Rosario
Unit 2621